Planos inclinados

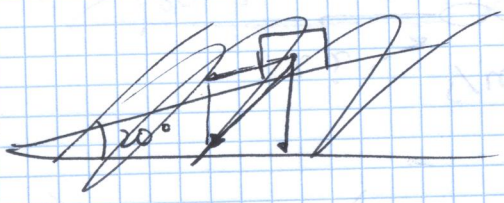
muelle $F = k \cdot x$

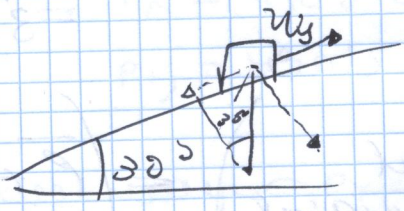
gravitatoria $F = G \cdot \frac{m_1 \cdot m_2}{d^2}$

eléctrica $F = k \cdot \frac{q_1 \cdot q_2}{d^2}$

MRU

$x = x_0 + v_0 \cdot t$;





$P = 19'62\ N$

$P_x = 19'62 \cdot \text{sen } 30 = 9'81\ N$ → $6'71$

$\mu = 0'1$

$P_y = 16'99\ N = N$

$18'44\ N = N$

$F_{ROZ} = \mu \cdot N =$

$= 0'1 \cdot 18'44 = 1'84\ N$

$\Sigma F = P_x - F_{ROZ} = 5'81 - 1'84 = 3'97\ N$;

$\Sigma F = m \cdot a$;

$3'97 = 2a$;

$a = 1'985\ m/s^2$

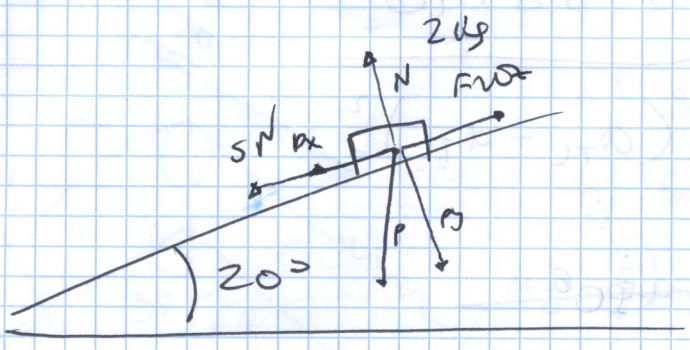
$F_{ROZ} = 0'1 \cdot 18'44 = 1'84\ N$;

$\Sigma F = P_x - F_{ROZ} = 4'87\ N$;

$\Sigma F = m \cdot a$

$4'87 = 2 \cdot a$;

$a =$



$P_x = 19'67 \cdot \sin 20° = 6'71$ N

$P_y = 18'44N = N$

$F_{nor} = 1'84N$;

$\Sigma F = P_x + 5N - F_{nor} = m \cdot a$;

$6'71 + 5 - 1'84 = 2a$;

$a = 4'785 \, m/s^2$ podeet

(4)

$m_T = 5'98 \cdot 10^{24}$ kg

$m_L = 7'35 \cdot 10^{22}$ kg

$d_{T-L} = 384000$ km $= 384 \cdot 10^6$ m

$F = 6'67 \cdot 10^{-11} \cdot \frac{5'98 \cdot 10^{24} \cdot 7'35 \cdot 10^{22}}{(384 \cdot 10^6)^2} =$

$= 1'99 \cdot 10^{20}$ N

$F_T + F_L = 0$;

$F_T = F_L$;

$\cancel{\mathcal{G}} \cdot \frac{M_T}{d_T^2} = \cancel{\mathcal{G}} \cdot \frac{M_L}{d_L^2}$;

$\frac{5'98 \cdot 10^{24}}{d_T^2} = \frac{7'35 \cdot 10^{22}}{d_L^2}$;

$d_T + d_L = d_{TL}$;

$d_L = d_{TL} - d_T$;

$$\frac{5{,}98 \cdot 10^{24}}{d_T^2} = \frac{7{,}35 \cdot 10^{22}}{(d_{TL} - d_T)^2}$$

~~$5{,}98 \cdot 10^{24} \quad (384 \cdot 10^6$~~

$5{,}98 \cdot 10^{24}$

$$(d_{TL} - d_T)^2 \cdot 5{,}98 \cdot 10^{24} = 7{,}35 \cdot 10^{22} \cdot d_T^2$$

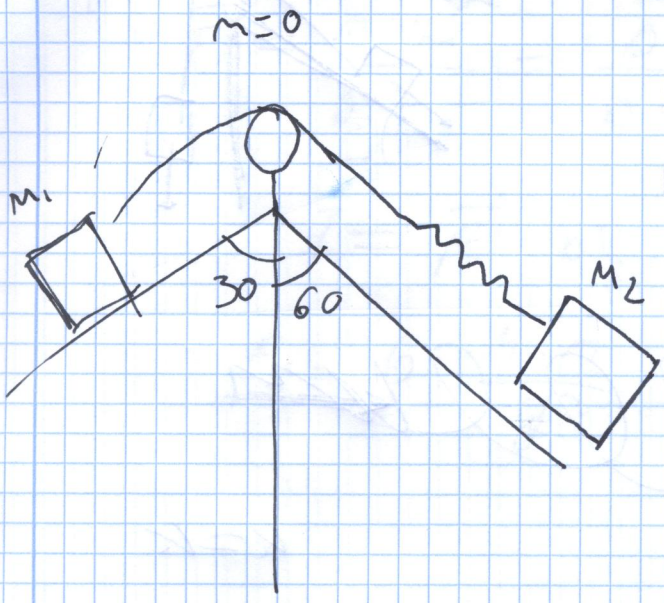
$$(d_{TL}^2 - 2 d_{TL}(d_T)) \cdot 5{,}98 \cdot 10^{24} = d_T \cdot 7{,}35 \cdot 10^{22}$$

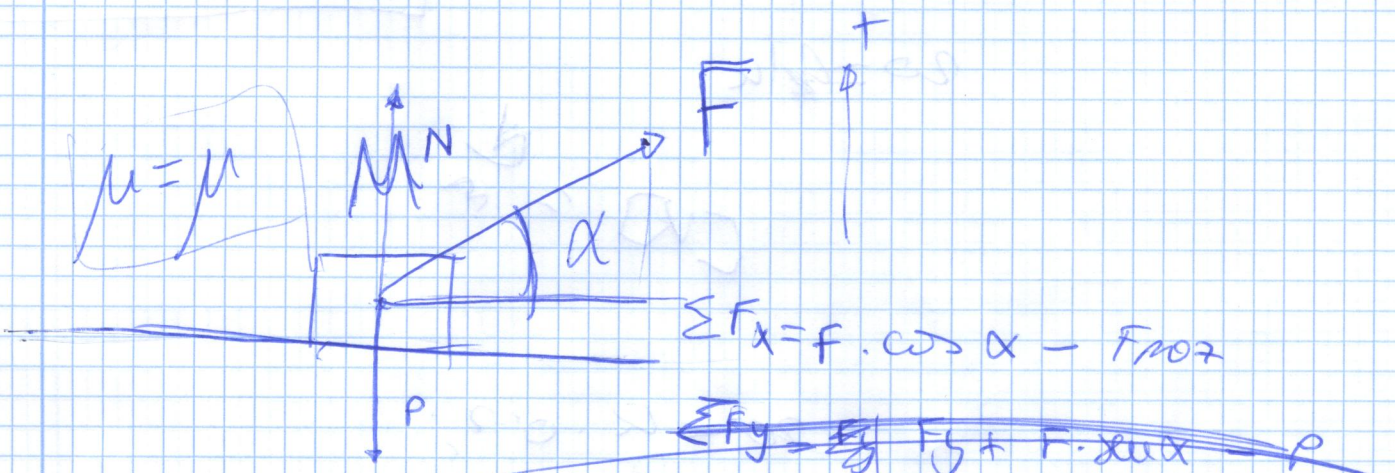
Buscar relación M_1 M_2 para:

a) sistema hacia derecha

b) sistema hacia izda

c) quieto parado





$\Sigma F_x = F \cdot \cos\alpha - F_{ROZ}$

$\Sigma F_y = F_y + F \cdot \text{sen}\alpha - P$

$\Sigma F = m \cdot a$

$F\cos\alpha - \mu(P - F\text{sen}\alpha)$

$+ F\text{sen}\alpha + P - F\text{sen}\alpha - P =$

$m \cdot a$

$\Sigma F_y = F \cdot \text{sen}\alpha + N - P$

$F\text{sen}\alpha + N - P = 0$

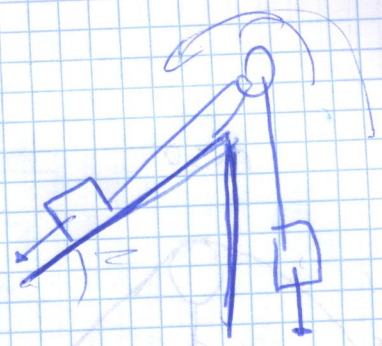
$\boxed{N = P - F\text{sen}\alpha}$

$F_{ROZ} = (P - F\text{sen}\alpha) \cdot \mu$

$\Sigma F_x = m \cdot a_x$

$F\cos\alpha - \mu P + \mu F\text{sen}\alpha = m \cdot a_x$

$\boxed{F(\cos\alpha + \mu \text{sen}\alpha)}$



$k = k$

$10\,cm = 0{,}2\,m$

$20 = k \cdot 0{,}2$

$[k] = \frac{N}{m}$

$20 = k \cdot 0{,}2$

$k =$

$\underrightarrow{20\,N} \quad -\underleftarrow{|F_k|\,\hat{i}}$

$\sum \vec{F} = 0 \quad \begin{pmatrix} |20| \\ 0 \\ 0 \end{pmatrix} + \begin{pmatrix} -|F_k| \\ 0 \\ 0 \end{pmatrix} = 0$

$20 - F_k = 0 \quad \boxed{20 = kx}$

$$\vec{F} = m \cdot a$$

$$\vec{F} = \frac{m \cdot \Delta \vec{v}}{\Delta t} = \frac{\Delta \vec{p}}{\Delta t}$$

$$\vec{I} = \vec{F} \cdot \Delta t$$

$$F_б = 6 \cdot \frac{M \cdot m}{d^2}$$

MRU

$\vec{r}(t) = \vec{r_0} + \vec{v} \cdot t$;

$x = x_0 + v_0 \cdot t$

$v = cte$ m/s

$a = 0$ m/s^2

MRUA

$v = v_0 + a \cdot t$;

$x_f = x_0 + v_0 \cdot t + \frac{1}{2} a t^2$

$v_0^2 - v_0^2 = 2as$ (acelera)

$v_0^2 - v_0 = 2as$ (desacelera)

MCU (cualquier círculo en vd xd)

$\theta = \frac{s}{R}$; posición angular

$s = R \cdot \theta$ lineal

$\omega = \frac{\theta}{\Delta t}$ velocidad angular

$v = \omega \cdot R$ lineal

$\alpha = \frac{\Delta \omega}{\Delta t}$;

$a_T = \alpha \cdot R$ (solo en MCUA)

$a_N = \frac{v^2}{R} = \omega^2 \cdot R$

$a_N = \omega^2 \cdot R = \frac{v^2}{R}$

$a_T = \alpha \cdot R$

$\alpha = \frac{\Delta \omega}{\Delta t}$

$\omega = \frac{\Delta \theta}{\Delta t}$

$v = \omega \cdot R$

MCU

$\theta = \theta_0 + \omega \cdot t$

$\omega = cte$

~~$\alpha = 0$~~

$a_N \neq 0$ } cuidado!!

MCUA

$\omega = \omega_0 + \alpha \cdot t$

$\theta = \theta_0 + \omega_0 \cdot t + \frac{1}{2} \alpha t^2$

$\vec{F} = m \cdot a$ $\quad \vec{P} = m \cdot g$ (peso)

$\vec{F} = \frac{m \cdot \vec{v}}{t} \rightarrow F_T \cdot \Delta t = m \cdot \Delta \vec{v}$

$\vec{F} = \frac{\vec{P}}{t}$

$\vec{p} = m \cdot \vec{v}$ (momento lineal)

$I = \vec{F} \cdot \Delta t$

$\left(\vec{P}_{\substack{\text{total} \\ \text{inicial}}}\right) = \left(\vec{P}_{\substack{\text{total} \\ \text{final}}}\right)$ conservación momento lineal :)

$g = G \cdot \frac{m}{d^2}$ N ; $\left(\vec{F} = m \cdot \vec{g} = \frac{M \cdot m}{d^2} \cdot G\right)$

$F_{12} = G \cdot \frac{m_1 \cdot m_2}{d^2}$ N

$F_E = K \cdot \frac{q_1 \cdot q_2}{d^2}$ N

$F_{ELAST} = -K \cdot x$

↓

LF - Ley

CINEMATICA: tiro parabolico.

Ejercicio 2

$v_0 = 10\ m/s$

(y) h_{max} ?

x_{max} ?

$v_F = ?$

$v_0 = 10\ m/s$

$v_{0x} = 10 \cdot \cos 60° = 5\ m/s$

$v_{0y} = 10 \cdot \sin 60° = 8'66\ m/s$

(mru) ~~eje~~

$v_{0x} = 5\ m/s = cte$

$x = x_0 + v_0 \cdot t;$

$x = 0 + 5t;$

$x_{max} = 5t$

$x_{max} = 8'73\ m$

mrua

$v_{0y} = 8'66\ m/s$

$a = ?$

$v_{Fy} = v_{0y} + g \cdot t;$

$\rightarrow v_{Fy} = 8'66 - 9'81t$

$y = y_0 + v_{0y} \cdot t + \frac{1}{2} g t^2;$

$0 = 0 + 8'66\,t - 4'905\,t^2;$

~~$8'66\,t$~~

$t \cdot (8'66 - 4'905\,t) = 0$

$t = 0;$ ~~$\neq 0$~~

$8'66 - 4'905\,t = 0;$

$t = 1'766\ s$

$v_{fy} = 8'66 + 9'81 \cdot 1'766 =$

$= -8'66$ ~~m/s~~

(Modulo del vector velocidad final)

$|\vec{v}_f| = (5, -8'66)$

$v_{0x} = 5\ m/s$

$v_{0y} = 8'66\ m/s$

$v_0 = 10\ m/s$

60°

MRU

$v = cte$

$x = x_0 + v_0 \cdot t;$

$x = 0 + 5t;$

$x = 5t$

$x = 8'8\ m$

MRUA

$v_f = v_0 + g \cdot t$

eje y max

$0 = 8'66 - 9'81\, t;$

$t = 0'88\ s$

$y = y_0 + v_0 \cdot t + \frac{1}{2} g t^2;$

$y = 0 + 8'66 \cdot 0'88 + 4'905 \cdot 0'88^2 =$

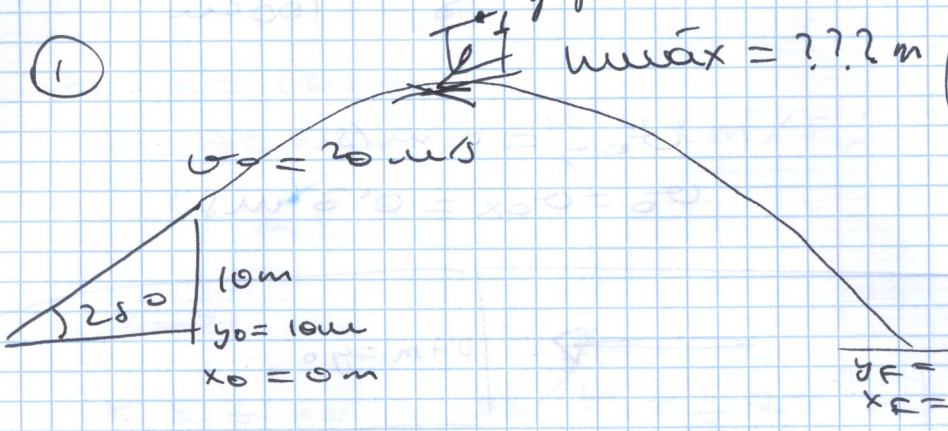
$= 3'85\ m;$

eje x max

$0 = 0 + 8'66\, t - 4'905\, t^2;$

$t = \frac{8'66}{4'905} = 1'766\ s;$

tiro parabólico
duque
cruzan
cruce
derivar
mrua, mru

① 

$v_{0x} = 20 \cdot \cos 28° = 18'126$ m/s →

$v_{0y} = 20 \cdot \operatorname{sen} 28° = 8'452$ m/s

mru

$v_x = cte = 18'126$ m/s

$x_F = x_0 + v_0 \cdot t$;

$x_F = 0 + 18'126 t$;

$\boxed{x_F = 18'126 t}$

~~$x_F = 78'84$ m~~

34'02 m

mrua

$v_{yF} = v_0 + g \cdot t$;

$v_{yF} = 8'452 - 9'81 t$;

cuando hmax, $v_y = 0$ ⇒ $0 = 8'452 - 9'81 t$;

$t = 0'862$ s

ahora hmax

$y_F = y_0 + v_{0y} \cdot t + \frac{1}{2} g t^2$;

~~$y_{max} = 10 + 8'452 - 4'905 \cdot 0'862$~~

~~$= 7'776$ m~~;

xmax

$0 = 10 + 8'45 \cdot 0'862 - 4'905 t^2$;

$t = 1'877$ s

$t \cdot (8'452 - 4'90 t) = 0$;

~~$y = y_0 + v_0 \cdot t + \frac{1}{2} g t^2$;~~

~~$0 = 10 + 8'452 \cdot t - 4'905 t^2$;~~

cuando xmax;

$0 = 10 + 8'452 - 4'905 t^2$;

$t = 4'07$ s;

$y_F = 10 + 0'862 \cdot 8'452 - 4'905 \cdot 0'862^2$

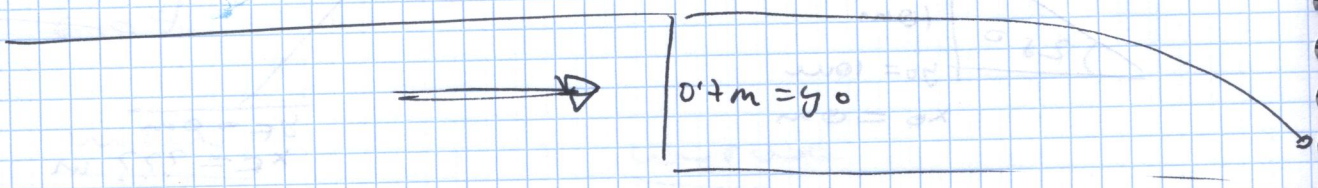
$= 13'64$ m;

zeptic 1

$80 \frac{cm}{s} \cdot \frac{1\ m}{100\ cm} = 0'8\ m/s$

② $v_{0y} = 0\ m/s$

$v_0 = v_{0x} = 0'3\ m/s$;



$y_f = 0$

$x_f = ?$;

mru

$x = x_0 + v_x \cdot t$;

$v_x = cte = 0'3\ m/s$;

$x = 0 + 0'3t$;

$x = 0'3t$

$x = 0'113m =$

$= 11'3\ cm$

mruv

$v_y = v_{0y} + g \cdot t$;

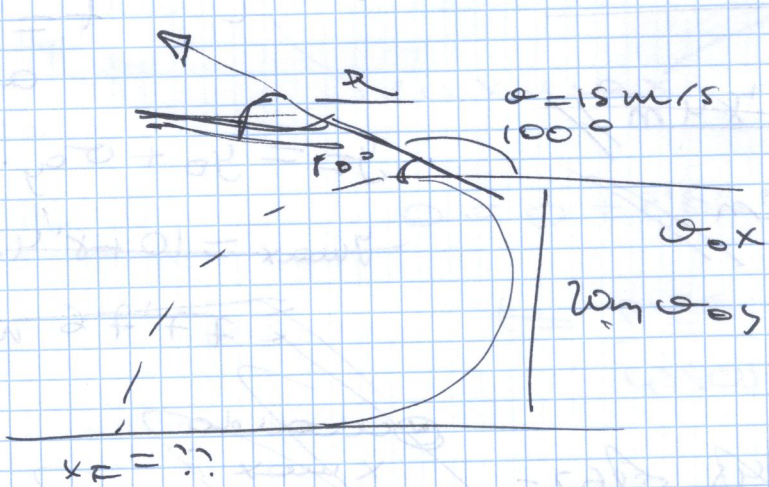
$v_y = -9'81 \cdot t$;

$y_f = y_0 + v_{0y} \cdot t^0 + \frac{1}{2} g t^2$;

$0 = 0'7 - 4'905 t^2$;

$t = \sqrt{\frac{0'7}{4'905}} = 0'378\ s$

③



$v_{0x} = 15 \cdot \cos 80° = 2'605$

$v_{0y} = 15 \cdot \sin 80° = 14'77\ m/s$

mru

$v_x = cte = 2'605 m/s$

$x = 2'605 t$

$x = 4'25\ m$:(((

mruv

$v_f = v_0 + g \cdot t$;

$v_f = 14'77 - 9'81 t$;

$0 = 20 + 14'77 t - 4'905 t^2$;

$0 = 14'77 - 4'905 t$

$t = 1'635$

Puedes lanzarlo 2° antes

mruv

en $x = 100m$,

$v = 70 km/h = 19'44 m/s$;

$a = ?$

$x =$

$$* \; x = x_0 + v_0^{0} \cdot t + \frac{1}{2} a t^2 \; ; \qquad v_f = v_0 + a \cdot t$$

$$100 = 0 + \frac{1}{2} a t^2 \; ; \qquad v_f = a \cdot t$$

$$100 = \frac{1}{2} a t^2 \; ; \qquad 19'44 = a \cdot t \; ; \qquad a = \frac{19'44}{t} \; ;$$

$$100 = \frac{1}{2} \cdot \frac{19'44 t^2}{t} \; ; \qquad 100 = \frac{19'44 t}{2} \; ;$$

$$t = \frac{200}{19'44} = 10'05 s$$

$$a = 1'89 m/s^2$$

b) velocidad a 50 m del principio.

$$50 = 0 + v_0^{0} \cdot t + \frac{1}{2} a t^2$$

$$50 = \frac{1}{2} 1'89 t^2 \; ;$$

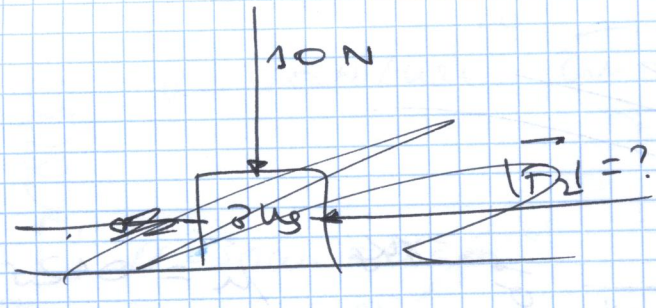
$$v_f = v_0^{0} + a \cdot t \; ; \qquad v_f = 1'89 t \; ;$$

$$\begin{cases} 50 = 0'945 t^2 \\ v_f = 1'89 t \end{cases}$$

$$t = 7'27 s \; ;$$

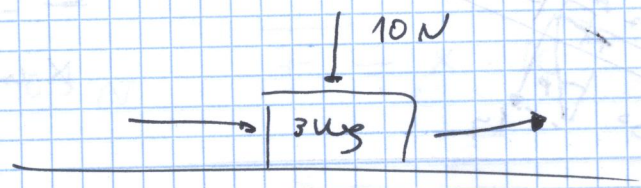
$$v_f = 13'75 m/s$$

①



$\Delta t = 2s$

$v = 10\ m/s$



mru

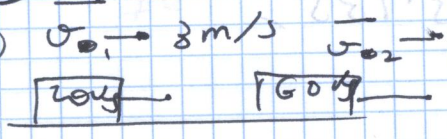
$\vec{F} = m \cdot a$

$a = ??$ $\quad \frac{\Delta \vec{v}}{\Delta t} = \frac{10}{2} = 5$

$F_T = 15N$; módulo de fuerza = 5N

②

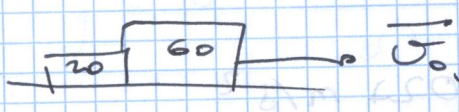
① $\vec{v}_{o_1} \rightarrow 3m/s$ $\quad \vec{v}_{o_2} \rightarrow 5m/s$



$\vec{P} = m \cdot \vec{v}$

$\left(\vec{P}_{\substack{\text{total} \\ \text{inicial}}}\right) = \left(\vec{P}_{\substack{\text{total} \\ \text{final}}}\right)$

②



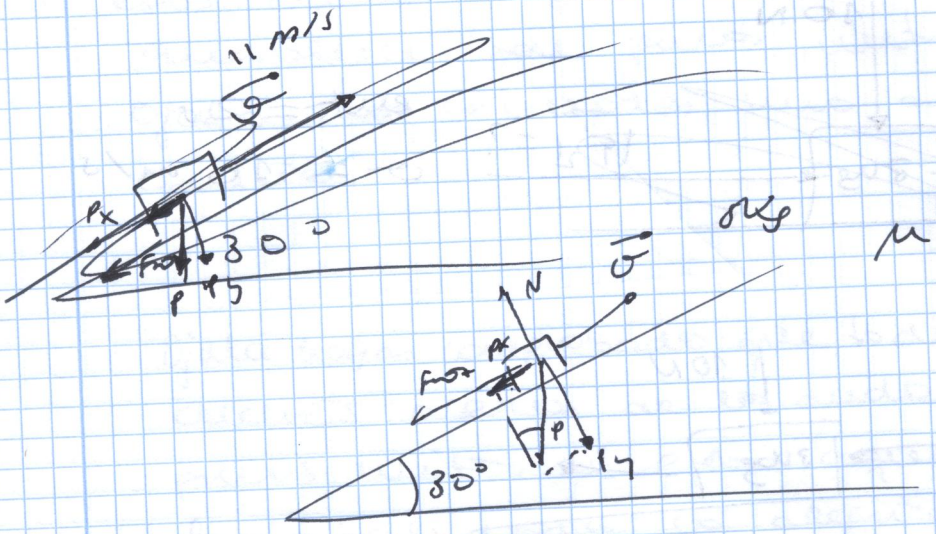
$m_1 \cdot \vec{v}_1 + m_2 \cdot \vec{v}_2 = (m_1 + m_2) \cdot \vec{v}_3$;

$20 \cdot 3\hat{i} + 60 \cdot 5\hat{i} = 80 \cdot \vec{v}_3$

$\Rightarrow v_3 = 4\hat{i}\ m/s$

(Es unidimensional, así que no indicamos $\hat{i}$ ni $\hat{j}$)

(3)



$\mu = 0'25$

$a = ??$

$x_{max} = ?$

$\overline{P} = 5 \cdot 9'81 = 49'05\ N$

$\overline{P_x} = 49'05 \cdot \sin 30° = 24'525\ N$

$\overline{P_y} = 49'05 \cdot \cos 30° = 42'478\ N = N$

$\Sigma F = m \cdot a;$ $\quad F_{roz} = \mu \cdot N = 10'61$

$F_{roz} + P_x = 5 \cdot a;$

$-10'61 + 24'525 = -35'135;$

$\frac{-35'135}{5} = a; -7'027\ m/s^2$

$x = x_0 + v_0 \cdot t + \frac{1}{2} a t^2;$

$x = 11t - 3'5135 t^2;$

$v = 11 - 7'027 t;$

$t = 1'57\ s$ para

$x = 11 \cdot 1'57 - 3'5135 \cdot 1'57^2 = 8'56\ m$

④

$K = 20 \frac{N}{cm} \cdot \frac{100\ cm}{1\ m} = 2000\ N/m$

$l_f = 30\ cm = 0'3\ m$

$5\ kg$ $\quad l_0 = ??$

$\vec{P}$ $49'05\ N$ $\quad \vec{F} = x \cdot k$

$x = \frac{F}{k}$; $x = \frac{49'05}{2000} = 0'0245\ m$

$0'3 - l_0 = 0'0245$

$l_0 = 0'275\ m = 27'5\ cm$

⑤ $m_{e^-} = 9'1 \cdot 10^{-31}\ kg$ $\quad d = 5'29 \cdot 10^{-11}\ m$

$m_{p^+} = 1'67 \cdot 10^{-27}\ kg$

$q_{e^-} = -q_{p^+} = \pm 1'6 \cdot 10^{-19}\ C$

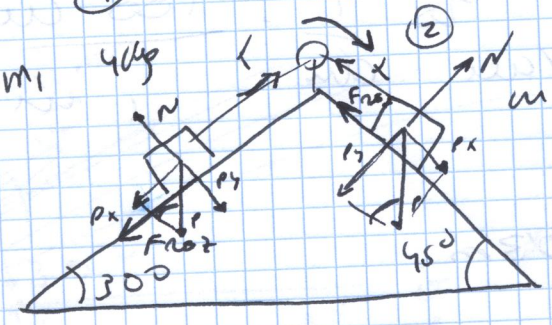
$\vec{F}_g = G \cdot \frac{m_1 \cdot m_2}{d^2} = 6'67 \cdot 10^{-11} \cdot \frac{9'1 \cdot 10^{-31} \cdot 1'67 \cdot 10^{-27}}{(5'29 \cdot 10^{-11})^2} =$

$= 3'62 \cdot 10^{-47}\ N$

$\vec{F}_e = G \cdot \frac{1'6 \cdot 10^{-19}\ C}{(5'29 \cdot 10^{-11})^2} = 3'81 \cdot 10^{-7}$ N

⑥

$\mu = 0{,}2$



$a = ??$

cuerpo 1:

$P = 39{,}24N$;

$P_x = 39{,}24N \cdot \sin 30° = 19{,}62N$

$P_y = |N| = 33{,}98N$

$\Sigma F = m \cdot a$;

$\Sigma F_1 =$

$-P_x - Frot = 4a$;

$-19{,}62 - 6{,}717 = 4a$;

$-26{,}42 = 4a$

$\Sigma F_2 = P_x - Frot = 5a$;

$27{,}74 = 5a$;

$-26{,}42 = 4a$
$27{,}74 = 5a$

cuerpo 2

$P = 49{,}05N$

$P_x = 49{,}05 \cdot \cos 45° =$
$= P_y = |N| = 34{,}68N$

$$\vec{\Sigma F_1} = T - P_x - F_{roz} = m \cdot a;$$

$$\vec{\Sigma F_1} = T - 26'42 = 4a;$$

$$\vec{\Sigma F_2} = P_x - F_{roz} - T;$$

$$\vec{\Sigma F_2} = 34'68 - 6'736 - T;$$

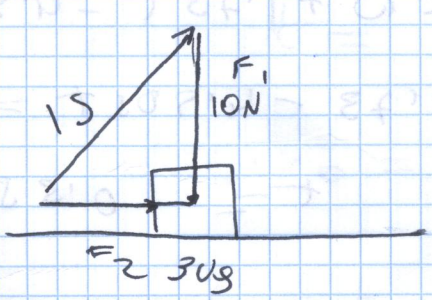
$$\vec{\Sigma F_2} = 27'74 - T$$

$$\left.\begin{aligned} T - 26'42 &= 4\vec{a} \\ -T + 27'74 &= 5\vec{a} \end{aligned}\right\}$$

$$1'324 = 9a;$$

$$\vec{a} = 0'15\ m/s^2 //$$

(1)



$$10 = 0 + a \cdot 2;$$

~~$a = 5'5\ m/s^2$~~

$$a = 5\ m/s$$

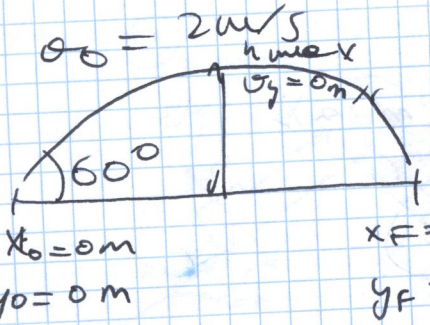
$$\vec{\Sigma F} = m \cdot a;$$

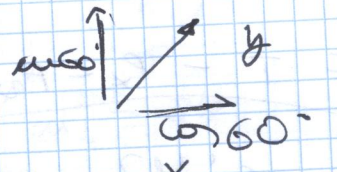
$$\vec{\Sigma F} = 3 \cdot 5 = 15\ N;$$

~~ΣF~~

$$15^2 = 10^2 + F_2^2;$$

$$F_2 = 11'18\ N //$$





$v_{0x} = 2 \cdot \cos 60° = 1\,m/s$

$v_{0y} = 2 \cdot \mathrm{sen}\,60° = 1{,}73\,m/s$

tiro parabolico

mru

$v_x = cte = 1\,m/s$

$x = 0 + t;$

$x = t$

$x = 0{,}35\,m =$

$= 35\,cm$

mrua

$v_{f_y} = v_{0_y} + g \cdot t;$

$v_f = 1{,}73 - 9{,}81\,t;$

v_{max} → $0 = 1{,}73 - 9{,}81\,t;$

$t = 0{,}177\,s$ (al cuadrado) (t_{max})

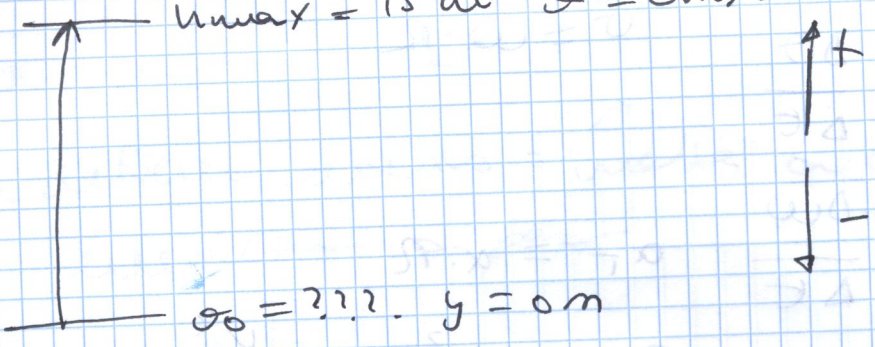
$y = 0 + 1{,}73 \cdot 0{,}177 - 4{,}905\,0{,}177^2$

$= 0{,}15\,m = 15\,cm$

$0 = 0 + 1{,}73\,t - 4{,}905\,t^2;$

$1{,}73 - 4{,}905\,t = 0;$

$t = 0{,}35\,s;$



~~curso~~ (5)

~~$y = y_0 + v_0 \cdot t$~~

$y = y_0 + v_0 \cdot t + \frac{1}{2} g t^2$;

$15 = v_0 \cdot t - 4'905 t^2$;

$v = v_0 + g \cdot t$;

$0 = v_0 - 9'81 t$;

$v_0 = 9'81 t$

$15 = 9'81 t \cdot t - 4'905 t^2$;

$4'905 t^2 = 15$;

$t = 1'749$ s;

$v_0 = 17'155$ m/s

b) y en $t = 2$ s; ~~$v_0 = 17'155$ m/s~~

en $t = 1'749$ s → $y = 15$ m

0'251 s más con $v_0 = 0$ m/s (caída libre)

$y = 15 - 4'905 t^2$; $v_f = -9'81 \cdot 0'251$

$y = 18'69$ m

mcircolare

$$\omega = \frac{\Delta\theta}{\Delta t} \qquad v = \omega \cdot R$$

$$\alpha = \frac{\Delta\omega}{\Delta t} \qquad a_T = \alpha \cdot R$$

$$a_N = \omega^2 \cdot R = \frac{v^2}{R}$$

$R = 3\,m$

1 ruota → 1 Fs

mcua

$$\omega_f = \omega_0 + \alpha \cdot t$$

~~$\omega_f = 0 + \alpha \cdot 18$~~

~~$\alpha =$~~

$$\omega = \frac{2\pi}{18} = 0{,}349 \ rad/s$$

~~$0{,}349 = 1 \alpha$~~ $\quad a_N = \omega^2 \cdot R =$

~~$\alpha =$~~

$$= 0{,}366 \ rad/s^2$$

$$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{-0{,}349}{0\,s} = -0{,}349 \ \frac{rad}{s^2}$$

(1)

$$\frac{10 \cdot 2\pi}{1} = 20\pi \text{ rad/s}$$

10 rad/s

[illegible] [illegible] 3 volte [illegible] [illegible] [illegible] a [illegible]

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

$$\omega = \omega_f + \alpha \cdot t;$$

$$\begin{cases} 0 = 10 + \alpha \cdot t \\ 6\pi = 0 + 10t + \frac{1}{2}\alpha \cdot t^2 \end{cases}$$

~~$t = -10$~~

$$\alpha = \frac{-10}{t}$$

$$6\pi = 10t + \frac{1}{2} \cdot \frac{-10t^2}{t};$$

~~$6\pi - 10 = -5t;$~~

~~$t = \frac{6\pi - 10}{-5}$~~

$$-5t^2 + 10t - 6\pi = 0;$$

$$5t^2 - 10t + 6\pi = 0;$$

$$t^2 - 2t + 3'769 = 0;$$

$$t = \frac{2 \pm \sqrt{4 -}}{}$$

$$6\pi = 10\,t + \frac{1}{2}\alpha t^2$$

$$0 = 10 + \alpha \cdot t$$

$$\alpha = \frac{-10}{t}$$

$$t = \frac{-10}{\alpha}$$

$$6\pi = 10 \cdot \left(\frac{-10}{\alpha}\right) + \frac{1}{2}\alpha\left(\frac{-10}{\alpha}\right)^2$$

$$6\pi = \frac{-100}{\alpha} + \frac{\alpha \cdot 100}{2\alpha^2}$$

$$6\pi = \frac{-100}{\alpha} + \frac{50}{\alpha}$$

$$\alpha \cdot 6\pi = -100 + 50$$

$$\alpha = \frac{-50}{6\pi} = -2'65 \text{ rad/s}^2$$

$$t = 3'775$$

$$a_n = \omega^2 \cdot R \qquad \vec{F} = m \cdot \vec{a}$$

$$a_T = \alpha \cdot R \qquad \vec{F} = \frac{m \cdot \Delta\vec{v}}{\Delta t}$$

$$\alpha = \frac{\Delta\omega}{\Delta t}$$

mrua	mcu
$a = cte$	$\omega = cte$
$x = x_0 + v_0 \cdot t$	$\theta = \theta_0 + \omega_0 \cdot t$
$c = 0$	$x = 0$
mrua	

$$v(t) = \frac{1}{2}t^2 + 2t$$

$$a(t=2)$$

$$a = \frac{dv(t)}{dt}$$

$$a(t) = \frac{dv(t)}{dt} = t + 2$$

$$a(2) = 4 \text{ m/s}^2$$

$$x(t) = e^t + 2t^2 + \text{sen}\, t$$

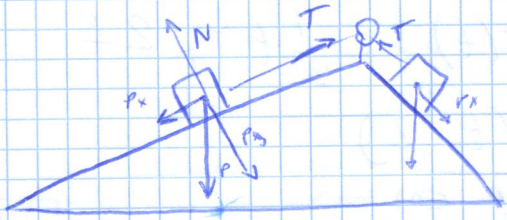
$$v(t) \quad , v(t=1)$$

$$a(t)$$

$$v(t) = \frac{dx(t)}{dt} = 1 \cdot e^t + 4t + \omega + 0 =$$

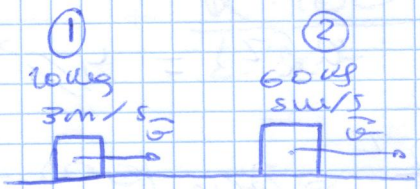
$$= e^t + 4t + \omega t$$

$$a(t) = \frac{dv(t)}{dt} = e^t + 4 + \text{sen}\, t$$



(2)

momento 1



momento 2

$$\vec{p} = m \cdot \vec{v} \; ; \quad \left(\vec{p}_{\substack{\text{total} \\ \text{inicial}}}\right) = \left(\vec{p}_{\substack{\text{total} \\ \text{final}}}\right)$$

$$m_1 \cdot \vec{v}_1 + m_2 \cdot \vec{v}_2 = (m_1 + m_2) \cdot \vec{v}_3$$

$$20 \cdot 3\,\vec{i} + 60 \cdot 5\,\vec{i} = 80 \cdot \vec{v}_3 \; ;$$

$$\vec{v}_3 = \frac{60\,\vec{i} + 300\,\vec{i}}{80} = 4{,}5\,\vec{i}$$

45 rpm

1 vuelta 2π

$$45 \cdot \frac{2\pi}{60} = 1'57 \text{ rad/s}$$

alcanza 1'57 rad/s después de recorrer 4 vueltas.

$a_T = \alpha \cdot R$

$a_N = \omega^2 \cdot R$

$(8\pi \text{ rad})$

$\alpha = ?$

$$8\pi = \frac{1}{2} \alpha \cdot t^2$$

$a_N = \omega^2 \cdot R$

$a_T = \alpha \cdot R$

$$\alpha = \frac{\Delta \omega}{\Delta t}$$

$$8\pi = \frac{1}{2} \alpha \cdot t^2;$$

$$\alpha = \frac{1'57 \cdot t^2}{t} = 0'049 \text{ rad/s}^2$$

$$8\pi = \frac{1}{2} \cdot \frac{1'57 t^2}{t};$$

$$8\pi = 0'785 t;$$

$$t = 32'02 \text{ s}$$

15cm = 0'15m

α = ???

cuando ha dado 1/4 vuelta,

ha recorrido 1,57 rad

$$\alpha = \frac{\Delta w}{\Delta t}$$

$$w = w_0 + \alpha \cdot t$$

$$1'57 = \frac{1}{2} \alpha t^2$$

60 cm Ø 72 rpm

30 cm radio → 0'3 m

- w
- T
- v
- aN

$$w = \frac{\Delta \theta}{\Delta t}$$

72 rpm → 7'54 rad/s

T =

$a_N = w^2 \cdot r$

1 min — 72 vueltas

1 vuelta — 1 vuelta

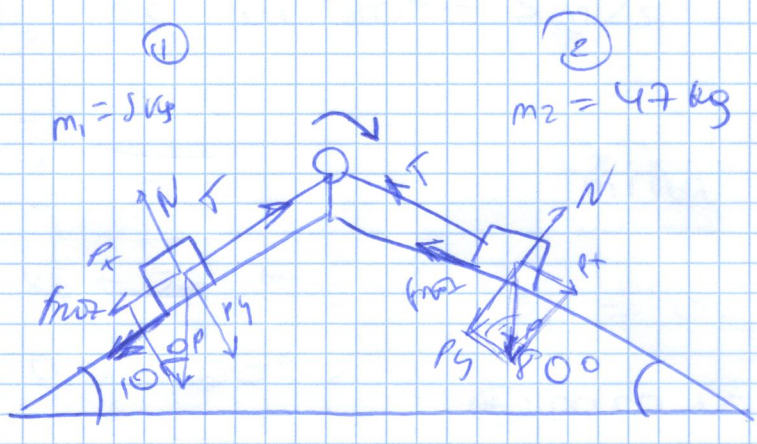
300 rpm → 31'42 rad/s

Radians en $t = 10s$;

$\omega = 31'42$ rad/s //

$$\alpha = \frac{\Delta\omega}{\Delta t} = \frac{-31'42}{10} = -3'142 \text{ rad/s}^2 //$$

b) ω en $t = 3s$



$\mu = 0'33$

cuerpo 1

$\Sigma F = m \cdot a$;

$T - P_x - F_{ROZ} = 5a$;

$T - 0'87 - 1'64 = 5a$;

$T - 2'51 = 5a$

cuerpo 2

$\Sigma F = m \cdot a$;

$P_x - F_{ROZ} - T = m \cdot a$;

$8'16 - 15'43 - T = 47a$;

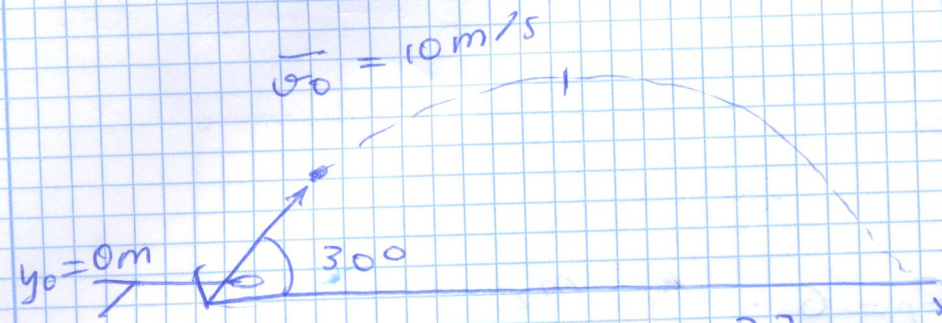
$-T - 7'27 = 47a$;

$T / -2'51 = 5a$

$-T - 7'27 = 47a$

$-9'78 = 52a$;

$a = -0'188 \text{ m/s}^2$



$\vec{v_0} = 10 m/s$

$\vec{v_{0x}} = 10 \cdot \cos 30° = 8'66 m/s = cte$

$\vec{v_{0y}} = 10 \cdot \sin 30° = 5 m/s$

mru

$x_F = x_0 + v_x \cdot t$;

$x_F = 0 + 8'66t$;

$x_F = 8'66t$

$x_F = 8'66 \cdot 1'02 =$

$= 8'83 m$

mrua

$v_F = v_{0y} + g \cdot t$;

(*) para la altura máxima:

$0 = 5 - 9'81t$;

$t = 0'51 s$

(el cual tiempo alcanza la h_{max});

$h_{max} = 0 + 5 \cdot 0'51 - 4'905 \cdot 0'51^2$

$= 1'27 m$

(*) para x_{max}

$y_F = y_0 + v_{0y} \cdot t + \frac{1}{2} g t^2$

$0 = 0 + 5t - 4'905 t^2$;

$5 - 4'905 t = 0$;

$t = 1'02 s$ alcanza x_{max}